



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/506,895	09/07/2004	Ichiroh Yamasaki	900-505	5426
23117 7590 10/09/2007 NIXON & VANDERHYE, PC 901 NORTH GLEBE ROAD, 11TH FLOOR ARLINGTON, VA 22203			EXAMINER HALL, ASHA J	
			ART UNIT 1795	PAPER NUMBER
			MAIL DATE 10/09/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/506,895

Applicant(s)

YAMASAKI ET AL.

Examiner

Asha Hall

Art Unit

1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 September 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6 and 8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6 and 8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>September 7, 2004</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-6, and 8 are rejected under 35 U.S.C. 102(b) as being anticipated by Nakai et al. (US 6,207,890).

With respect to claim 1, Nakai et al. discloses a photoelectric conversion device (col.1; lines:6-8) using a first conductivity type semiconductor substrate (1) (col.1; lines:40-51) having convex and concave portions formed on its surface (col. 2; lines: 19-23), the device being characterized in that it comprises (Figure 11):

- a second conductivity type semiconductor layer (2) formed on the surface of the first conductivity type semiconductor substrate (1) (col.1; lines:40-51);
- a front electrode(4) connected to the second conductivity type semiconductor layer(2) (col.3; lines: 33-39);
- a rear electrode (6) formed on the rear surface of the first conductivity type semiconductor substrate(1) (col.3; lines: 35-39),
- the second conductivity type semiconductor layer(2) being at its partial area contact with the front electrode and becoming thinner as it goes farther from the contacted area (Figure 11) (col.2; lines: 5-9).

Art Unit: 1753

In respect to claim 2, Nakai et al. discloses the photoelectric conversion device according to claim 1, wherein the convex portions/rounded uneven portions as shown in Figure 11 of the semiconductor substrate (1) are arranged at given intervals and the second conductivity type semiconductor layer becomes (2) thinner from the convex portions to the concave portions of the substrate (1) (col.2; lines: 5-9).

With respect to claim 3, Nakai et al. discloses a photoelectric conversion device according to claim 2, wherein each convex portion has the front electrode (4) as shown in Figure 11 (col.1; lines: 47-48).

In regard to claim 4, Nakai et al. discloses the photoelectric conversion device according to claim 1, wherein the convex portions of the semiconductor substrate (1) are arranged at given intervals as shown in Figure 11, and the second conductivity type semiconductor layer (2) become thicker from the top of the convex portions to the concave portions of the substrate (1) (Nakai et al. discloses that the second conductivity type semiconductor layer (2) being thinner on the bottom of the rounded portions, then it has been interpreted that it is thicker on the top) (col.2; lines: 5-8).

With respect to claim 5, Nakai et al. discloses the photoelectric conversion device according to claim 4, wherein each convex portion has the front electrode (4) (col.5; lines: 6-11) as shown in Figure 11.

In respect to claim 6, Nakai et al. discloses a method for manufacturing a photoelectric conversion device comprising the steps of:

(a) forming a film/a resist serving as a barrier against impurity diffusion on a

semiconductor substrate(1) (col.10; lines: 34-39) having convex and concave portions formed on its surface in such a manner that the film becomes thicker/larger from the convex portion/bottom curved portion to the concave portion (col.2; lines: 53-56); and

- (b) implanting second conductivity type (2) impurities into the semiconductor substrate (1) through the film to form a second conductivity type semiconductor (2) layer on the surface of the semiconductor substrate (col.10; lines:50-53);
- (c) forming a front electrode (8) that is in contact with the convex portion which constitutes a part of the semiconductor substrate surface (1) as shown in Figure 7 (col.11;lines: 32-34).

With respect to claim 8, Nakai et al. discloses method for manufacturing a photoelectric conversion device comprising the steps of:

- (a) forming a film containing second conductivity type (2) impurities on a semiconductor substrate(1) as shown in Figure 6 having convex and concave portions formed on its surface in such a manner that the film becomes thicker from the convex portion to the concave portion(col.11; lines: 5-10); and
- (b) implanting second conductivity type impurities into the semiconductor substrate from the film to form a second conductivity type semiconductor layer (2) on the surface of the semiconductor substrate (1) (col.11; lines: 47-55); and

Art Unit: 1753

(c) forming a front electrode(8) that is in contact with the concave portion which constitute a part of the semiconductor substrate surface as shown in Figure 7 (col.11; lines: 30-44).

Conclusion

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Asha Hall whose telephone number is 571-272-9812. The examiner can normally be reached on Monday-Thursday 8:30-7:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AJH

AJH

Alexa Neckel
ALEXA D. NECKEL
SUPERVISORY PATENT EXAMINER